

and rainy, and on both occasions ~300 living *A. kochii* were observed on the surface of the talus slope. Nine instances of predation were witnessed, and in each case the larva appeared to have consumed the entire soft anatomy of the snails. In addition, both adult and juvenile *A. kochii* were attacked by the lampyrid larvae.

The Lampyridae are well known predators of land snails (Balduf, 1935; Borror & DeLong, 1954; Schwalb, 1960) but predation on *Ashmunella* has not been reported in the field. Lampyrid larva and *Ashmunella* most likely share similar habitats (talus accumulations and leaf litter; Stehr, 1991), but predation may occur only when *Ashmunella* emerge from the deeper recesses of talus accumulations, as in the monsoon season (July to September) in southern New Mexico and western Texas. I often found dead larvae close to the surface of talus piles, while *Ashmunella* shells frequently require some digging to locate.

Finally, I witnessed two instances of predation of *Ashmunella* by birds. On 11 October 1999, I watched an adult female roadrunner (*Geococcyx californianus*) foraging on adult *A. organensis* on a talus slope in Soledad Canyon, Organ Mountains. The bird moved about the talus slope and appeared to smash seven individual snails with two quick raps from its beak. After the bird moved off, I was able to find a few remaining pieces of shell, but no soft tissue.

The second incident of predation by birds was more extensive. On 31 July 2000, while surveying for *Ashmunella salinasensis* Vagvolgyi, 1974, on Salinas Peak, San Andres Mountains, WSMR, I began to encounter freshly smashed adult and juvenile snails. Several rock wrens (*Salpinctes obsoletus*) were foraging on the slopes, and upon closer observation, it became clear that they were smashing and at least partially consuming the snails. As with the roadrunner, the rock wrens broke the shells with repeated strikes of their beaks. The attacked snails that I located had most of their soft tissue remaining, in contrast to those that were wholly consumed by the roadrunner.

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Observations of Predation on the Tropical Nudibranch *Okenia* sp. by the Sea Spider *Anoplodactylus longiceps* Williams (Arthropoda: Pycnogonida)

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We know very little about what preys on sea slugs (Piel, 1991), and especially on tropical species. Predation of opisthobranchs by pycnogonids has been documented several times from warm temperate habitats (Piel, 1991; Rogers et al., 2000). The following laboratory observations of the chelate pycnogonid *Anoplodactylus longiceps* Williams, 1941, feeding on the nudibranch *Okenia* sp. were recently obtained from samples of an intertidal microhabitat in tropical north Queensland, Australia.

In August 1999 fresh samples of the green alga *Cladophora prolifera* (Roth), were collected from the intertidal (low tide 0.4 m) sandy-muddy beach at Rowes Bay, Townsville, Australia (19°14'S, 146°47'E). Immediately after the field collection, tufts of *C. prolifera* were examined for sea spiders. Several species of sea spiders



Figure 1. A living specimen of the undescribed *Okenia* sp. (15 mm length) from an intertidal habitat in north Queensland, Australia. Photograph: Jon Brodie.

together with amphipods, caprellids, bryozoans, and hydroids were found to be abundant in the algae. A small (≈ 7 mm) phanerobranch dorid nudibranch, *Okenia* sp. (Figure 1) was also present in the samples. While sorting fauna under a dissecting microscope, we observed a slender sea spider, *Anoplodactylus longiceps*, feeding on the ceras of *Okenia* sp. An adult female of *A. longiceps* grabbed one of the nudibranch's cerata using its chelae (pincers). It then inserted its proboscis into the distal part near the tip, while using the claws of its front legs to hold onto the nudibranch's body (Figure 2). The sea spider remained in the same position for about 5 minutes, undergoing muscular movements of the proboscis and sucking out the contents of the ceras. During this process, the ceras was not autotomized from the body of the nudibranch. At one stage, a caprellid crustacean crawling onto the sea spider's dorsum interrupted this feeding activity. However, 2 minutes later, the sea spider approached the nudibranch again, and used its front legs to bring the ceras closer to the chelae. Once the chelae had pierced the ceras, the proboscis was immediately inserted and feeding continued as before. Due to the clear cuticle of the sea spider, it was possible to see the internal movement of fluids being sucked up, swallowed, and distributed to the diverticula along the pycnogonid trunk and legs. Feeding activity then continued for approximately 5 minutes on the same ceras. Once the prey was released, the pycnogonid used the chelae and claws of its anterior legs to clean tissue remains away from the oral surface at the tip of the proboscis. In the meantime another sea spider, of the same species, became attached to another ceras on the posterior side of the same nudibranch and started feeding with very

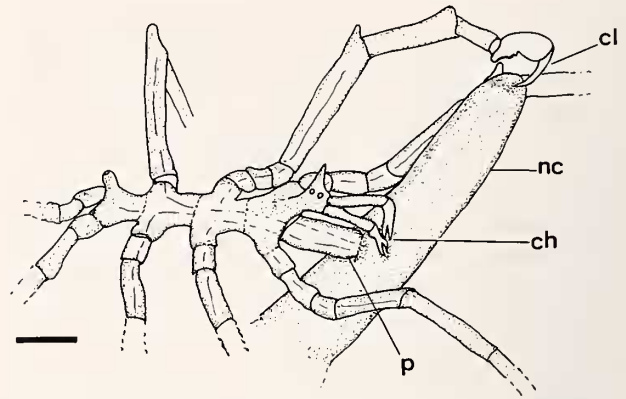


Figure 2. The sea spider *Anoplodactylus longiceps* feeding on a ceras of *Okenia* sp. ch = chelae of *A. longiceps* used to hold the ceras close to the oral surface; cl = claw on the propodus of the first leg of the sea spider grasping the nudibranch; nc = nudibranch ceras; p = proboscis of *A. longiceps*.

similar behavior. One hour later, the tank containing these samples was re-checked, and the sea spiders were still repeating the same behavior, piercing the tip of each of the nudibranch's many cerata. After feeding on each ceras they groomed the tip of the proboscis, removing any small solid pieces of nudibranch tissue from its oral surface. Each session of feeding by a single sea spider lasted between 5 and 10 minutes. The nudibranch moved very slowly during the pycnogonid feeding activity, and in the subsequent observations, the pierced nudibranch cerata had lost their normal dark purplish/brown color and brightness on the cerata apices. Three days later, the nudibranch was found noticeably denuded and all the cerata mutilated; after a few hours of no movement the nudibranch died.

The nudibranch observed in this study is an undescribed species of *Okenia* that is previously documented from the Philippines (Gosliner, et al., 1996; Coleman, 2001) and now recorded for the first time in northern Australia. The pycnogonid *A. longiceps* is widely distributed in the Indo-West Pacific and appears to be restricted to shallow-water habitats. Voucher specimens of both species have been lodged at the Museum of Tropical Queensland in Townsville, Australia.

Piel (1991) previously reported the observation of a sea spider sucking out nudibranch ceratal contents. However, in that case the nudibranch was capable of ceratal autotomy and thus the cerata were sacrificed and the nudibranch was able to move away from the predator. In our observations of *Okenia*, the sea spider may have been able to suck out more than just the fluids present in the ceras. This type of removal of internal fluids and tissue, by sucking at one point of entry, has also been observed between different species of tropical nudibranchs, i.e., *Gymnodoris* sp. preying on *Dendrodoris nigra* (Brodie et al., 1995). This is undoubtedly an effective strategy for

avoiding the defensive mantle structures (Avila & Dufort, 1992; Wägele, 1998) often found in the notum of many dorids. The presence and location of mantle glands in this species of *Okenia* remain to be investigated and may provide insight into the pycnogonids' feeding strategies. Like the *Anoplodactylus evansi* of Rogers et al. (2000), *A. longiceps* used its front four legs (with claws) to grasp and hold the prey. However, unlike *A. evansi*, *A. longiceps* showed no sign of using chelifores (cheliceræ) to tear pieces of flesh from the prey and pass them to the proboscis. We also observed no attempts by *A. longiceps* to consume the body section of *Okenia*.

The predation of nudibranchs by pycnogonids is obviously not an unusual occurrence. Our detailed observations are reported here in acknowledgment that, not only are reports on natural nudibranch predators rare, but also data on predation activities of pycnogonids from the tropics (but see Arango, 2001).

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International Commission on Zoological Nomenclature

The following Application concerning mollusks was published on 28 June 2002 in Volume 59, Part 2 of the *Bulletin of Zoological Nomenclature*. Comment or advice on any of these applications is invited for publication in the *Bulletin* and should be sent to the Executive Secretary, I.C.Z.N., % The Natural History Museum, Cromwell Road, London SW7 5BD, U.K. (e-mail: iczn@nhm.ac.uk).

Case 3233. *Achatina jani* De Betta & Martinati, 1855 (currently *Ceciloides jani*; Mollusca, Gastropoda): proposed conservation of the specific name.

The Following Application concerning mollusks was published on 30 September 2002 in Volume 59, Part 3 of the *Bulletin of Zoological Nomenclature*.

Case 3220. *Ovula gisortiana* Passy, 1859 (currently *Gisortia gisortiana*; Mollusca, Gastropoda): proposed precedence of the specific name over that of *Cypraea coombii* Sowerby in Dixon, 1850.

The following Opinions concerning mollusks were published on 28 June 2002 in Volume 59, Part 2 of the *Bulletin of Zoological Nomenclature*. Copies of Opinions can be obtained free of charge from the Executive Secretary, I.C.Z.N., % The Natural History Museum, Cromwell Road, London SW7 5BD, U.K. (e-mail: iczn@nhm.ac.uk).

Opinion 1996 (Case 3158). *Helix lucorum* Linnaeus, 1758 and *Helix punctata* Müller, 1774 (currently *Otala punctata*; Mollusca, Gastropoda): usage of the specific names conserved by the replacement of the syntypes of *H. lucorum* with a neotype.

Opinion 1997 (Case 3175). *Ampullaria canaliculata* Lamarck, 1822 (currently *Pomacea canaliculata*; Mollusca, Gastropoda): specific name conserved.